

REMARKS

Upon entry of the foregoing amendments, claims 1-9, 11-18, 20-34 are pending in the application. Claims 1, 9, 11-14, 16, 17, and 25-27 have been amended to clarify the inventive subject matter. The amendments do not introduce any new matter within the meaning of 35 U.S.C. §132. Therefore, entry of the amendments is respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. §112, SECOND PARAGRAPH

The Examiner has rejected claims 1-9, 11-18 and 20-33 under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Specifically, claim 1 recites “can be obtained”; claims 9, 11, 17 and 25 recite “may also contain”, which the Examiner has deemed indefinite; claims 12-14 recite “The proton conducting composite membranes of claim 11”, however claim 11 is directed to a method; claim 16 recites “the composite membrane of claim 15”, however claim 15 is directed to a method; claim 26 recites the “method of claim 21”, however claim 21 is directed to a product and claim 27 recites “A method for easy insertion”, however the term “easy” has been deemed indefinite by the Examiner.

Claim 1 has been amended to read “are obtained” rather than “can be obtained.” Therefore, the basis of this rejection has been removed.

Claims 9, 11, 17 and 25 have been amended to clarify that the subject matter recited after “may also contain” is optionally contained in the organic solutions of step a). The phrase “may be obtained” has therefore been deleted from the claims. As such, the basis of this rejection has been removed.

The dependency of claims 12-14 has been amended to be from claim 34, which is directed to a product. Therefore the basis of this rejection has been removed.

Claim 16 has been amended to read “The method of claim 15”. Therefore the basis of this rejection has been removed.

The dependency of claim 26 has been amended to be from claim 25, which is

directed to a method. Therefore the basis of this rejection has been removed.

Accordingly, the bases for the rejections under 35 U.S.C. §112, second paragraph has been removed, and the Examiner is respectfully requested to withdraw these rejections to the claims.

CLAIM REJECTIONS UNDER 35 U.S.C. §102

Rejection under 35 U.S.C. §102(a)

The Examiner has rejected claims 1-33 as being anticipated by Bauer et al. (WO 03/077340 A3 and U.S. Patent No. 7,108,935). Applicants respectfully traverse this rejection.

Bauer et al. fail to anticipate the instantly claimed subject matter, because the reference fails to teach each and every limitation of the claimed subject matter.

As previously noted, the instant subject matter is directed to an organic precursor **solution** (i.e. dissolved components in a solvent) of a zirconium salt and phosphoric and sulfoarylenephosphoric acid. The precursor solution contains chemical species of the zirconium phosphate sulfoarylenephosphate, which are converted into the final product only after the solvent evaporation.

In contrast, Bauer et al. teaches a **colloidal dispersion** which is a suspension or slurry of pre-formed insoluble particles of zirconium phosphate sulfoarylenephosphonate. Thus, the teachings of Bauer et al. are different from the instantly claimed solutions.

As such, the cited reference and the instant subject matter relate to two different procedures lead to the formation of filler particles deriving from different sources and possessing different morphology and distribution. This, in turn, results in different types

of composite membranes.

Furthermore, the Examiner states that Bauer et al. uses a starting polymer solution. However, Applicants respectfully clarify that there is a difference with respect to the “polymer solution” as taught by Bauer and the “organic solution containing metal(IV) salts and oxoacids of phosphorus” of the instant claims.

The area of art at issue relates to the preparation of composite membrane materials comprising a polymer uniformly filled with zirconium phosphate sulfoarylenephosphonate particles starting from solutions of polymers.

Applicants point out that the polymer solution of Bauer is mixed with the colloidal dispersion, i.e., the zirconium phosphate sulfoarylenephosphonate is first synthesized and then dispersed in a suitable solvent in order to form a colloidal dispersion.

However, in the instant application, the polymer solution is mixed with an organic solution of zirconium phosphate sulfoarylenephosphonate precursors which are converted into the final product only after solvent evaporation.

Therefore, Applicants submit that the polymer solutions identified by the Examiner are not parallel to the organic solution containing metal(IV) salts and oxoacids of phosphorus.

On these bases, Applicants respectfully submit that Bauer et al. fails to teach each and every limitation of the instant subject matter, and as such the rejection under 35 U.S.C. §102(a) based on Bauer et al. is improper. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw the rejection.

Rejection under 35 U.S.C. §102(a)

The Examiner has rejected claims 1-6 as being anticipated by Alberti et al. (U.S. Patent No. 5,892,080). Applicants respectfully traverse this rejection.

Alberti et al. fail to anticipate the instantly claimed subject matter, because the reference fails to teach each and every limitation of the claimed subject matter.

The presently claimed subject matter is described throughout and specifically Applicants note that the instant subject matter does not disclose zirconium sulfoarylenephosphonate materials obtained by using organic solutions of their precursors. The instant subject matter is directed to **organic solutions containing metal(IV) salts and oxoacids of phosphorus** which zirconium sulfoarylenephosphonate materials can be precipitated within the matrix of an ionomer so as to form a composite membrane.

As previously presented, Alberti et al. teach mesoporous solids obtained by reaction between a solution containing a mixture of di-phosphonic and phosphorous acids and a solution containing the tetravalent metal M(IV) and hydrofluoric acid. Alberti et al. do not teach a solution according to the instant subject matter.

The compounds of Alberti et al. have a structure and composition completely different from the zirconium phosphate sulfoarylenephosphonate. The former contains diphosphonate groups which confer a pillared structure to the solid. However, the latter, according to the instant subject matter, contains sulfoarylenemonophosphonate groups which confer a layered structure and protonic conductions.

Furthermore, no precursor solutions have been used to prepare the pillared compounds of Alberti et al. The organic solution the Examiner has cited, i.e., dioxane, clearly refers to solutions diposphonic acids, which are soluble in many organic solvents.

Finally, the organic solution of Alberti et al., i.e., dioxane, does not contain tetravalent metal, and therefore it cannot be considered a precursor solution. The product obtained from evaporation of the solvent is the diphosphonic acid before solubilized and not the insoluble M(IV) diphosphonate. Furthermore, the use of this solution is not in the preparation of the pillared compound, but it is used to modify the surface composition of preformed M(VI) phosphonate by topotactic exchange.

As such, Alberti et al. fail to teach the organic solution as presently claimed, as well as the synthetic route leading to the M(IV) phosphonate as presently claimed.

On these bases, Applicants respectfully submit that Bauer et al. fails to teach each and every limitation of the instant subject matter, and as such the rejection under 35 U.S.C. §102(a) based on Alberti et al. is improper. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw the rejection.

Rejection under 35 U.S.C. §102(b)

The Examiner has rejected claims 1-33 as being anticipated by Grot et al. (U.S. Patent No. 5,919,583). Applicants strenuously traverse this rejection.

Grot et al. fail to anticipate the instantly claimed subject matter, because the reference fails to teach each and every limitation of the claimed subject matter.

With the present subject matter, the components are included in one reagent solution. There is only one solution to impregnate the porous membrane, and there is no sequential introduction of several components prior to precipitation. There is also no immediate precipitation of the premixed components, and precipitation occurs only upon elimination of the solvent. The instant method is also applicable with the preparation of

ceramic composites for use in catalysts.

Additionally, the instant composite membranes are prepared by casting a mixture of a solution of the perfluorinated sulfonic acid polymer and a solution containing a tetravalent metal and the phosphonic acids so that the polymeric film and the inorganic filler are formed simultaneously during solvent evaporation.

However, Grot et al. teach that zirconium hydrogen phosphate can be precipitated in a pre-formed perfluorinated sulfonic acid polymer through a two step process. First, the **preformed membrane** is soaked in an aqueous solution containing zirconium ions. Next the membrane is further soaked in a solution of phosphoric acid.

As such, Grot et al. only teach a membrane containing the inorganic filler that is preformed. The **composite membrane** of the instant claims is prepared by casting a solution of the perfluorinated sulfonic acid polymer and a solution containing the tetravalent metal and the phosphonic acids. Both the polymeric film and the inorganic filler are formed simultaneously during the evaporation of the solvent. This is not taught by Grot et al., since Grot teaches the use of a preformed membrane.

As such, Grot et al. fail to teach the composite membrane of as presently claimed.

On these bases, Applicants respectfully submit that Grot et al. fails to teach each and every limitation of the instant subject matter, and as such the rejection under 35 U.S.C. §102(a) based on Grot et al. is improper. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw the rejection.

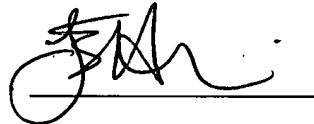
CONCLUSION

In view of the foregoing, Applicants respectfully submit that all claims pending in the application are novel and in condition for allowance. Therefore, Applicants respectfully request the Examiner to allow all claims pending in this application.

If the Examiner has any questions or wishes to discuss this matter, the Examiner is welcomed to telephone the undersigned attorney.

Respectfully submitted,

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A handwritten signature in black ink, appearing to be 'GM Nath', written over a horizontal line.

August 6, 2008

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